



Agricultural Research Institute, Pusa

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# Berseem as a new fodder crop for India

BY

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BERSEEM READY FOR THIRD CUT.

# Berseem as a new Fodder crop for India.

[Received for publication on the 19th July, 1916.]

## I. Introduction.

AS far as it is known Berseem (*Trifolium alexandrinum*) was first introduced and grown in India by Mr. Fletcher, then Deputy Director of Agriculture, Bombay, at the Government farm, Mirpur Khas, Sind, in 1904. Two varieties were tried—Fahli and Miscawi. The results were not very promising during the next three seasons though one plot yielded seed at the rate of 182 lb. per acre.

The writer on taking charge of the Mirpur Khas farm in 1907 was struck with the similarity of the surrounding country to the low salt country in the extreme north of Egypt. Seed was obtained from the north of Egypt with difficulty and nothing else was thereafter used. It is worth noting that the 'fellah' in Garbia and Behera looks on any seed from Upper Egypt with the greatest suspicion. The Fahli or Saidi seed is considered by him as an adulterant, pure and simple. He will buy nothing if he can help it but 'belladi' or local seed produced in the North. It is most difficult to buy berseem seed as a rule. It must be bought in small parcels in the village 'souks' or markets and it is nearly always dirty. Samples generally contain a proportion of chicory seed and 'senji' seed (*Melilotus parviflora*) besides sand and dirt and frequently dodder. The price fluctuates in an extraordinary degree. It may be anything up to £2-£3 per ardeb, say four maunds.

This question of the origin of berseem seed is undoubtedly important and especially large, plump, highly coloured seed which has probably come from Upper Egypt should be avoided. The names often given as Miscawi, Fahli, Khadrawi, Baali are of little importance. Miscawi or Belladi from the north coast is the only kind of seed which should be obtained for India.

The rôle that berseem plays in the agricultural economy of Egypt is very great, in lower Egypt alone out of a cultivated area of 3 million acres nearly 1 million acres berseem are sown each year. Without this crop it would not be possible to maintain the constant succession of crops under the great drain of perennial irrigation in the richest agricultural country of the world.

Berseem is a cold weather rotation crop and it may be said to feed the whole of the livestock of Egypt from November to June. Among the 'fellaheen' the cattle, horses, camels, goats and sheep get absolutely no other feeding. Usually the stock is tethered in the crop, and this method gives the best results except in cold wet weather which sometimes occurs in December and January.

## II. Berseem in Egypt.

In Egypt the seed is generally sown in September and October, though on fallow land if water is available it does very well sown in August. The young plants will not stand great heat especially if there is not an abundant supply of irrigation water. On the other hand, late sown berseem will suffer from cold in December if it has not been well started in growth. A common rotation in the north of Egypt is cotton followed by berseem in the first year, after several cuttings the latter is cut finally for seed in May of the second year, this is followed by maize or *jowar* which is again followed by berseem which is ploughed in in March before cotton. It is often sown among standing cotton before the last picking. A heavy watering is given and the seed is broadcasted in the standing water which should be at least 2" deep, at the rate of 2½ 'kelahs' to the 'feddan' or say 60 lb. to the acre. On new land in North Egypt much trouble is experienced by water stagnating in hollow places. This is fatal to the young plants. No trouble was experienced in Sind in this respect. On the other hand, the young plants must not be allowed to get too dry.

When berseem is sown among standing cotton, it, when ready for the first cutting, is cut down with the cotton stalks. This is a cheap method of sowing, it is economical of labour and irrigation water and the stalks give shade to the young plants if the weather is too hot. The disadvantage is that the soil among the cotton is tough and hard on the top and this would be better broken before sowing.

After maize or millet there is plenty of time to plough the land. This always gives the best results, as the soil is more absorbent and the young seed sinks into a damp firm seed bed.

If the land is level half acre plots are flooded and sown at once, but frequently smaller plots are sown. The seed is always soaked in water for 12-24 hours before sowing.

In 2-3 months after sowing the crop will be ready for the first cutting. It should be over 1 foot high with a few white flower heads showing. The number of waterings required varies immensely according to the soil. For the first month the young 'braird' requires careful watching especially on saltish land. Afterwards it is quite hardy. The 'fellaheen' consider it good practice to cut and carry the first cutting as the plants are supposed to tiller better. The cattle are tied along a neighbouring bund and a small girl is supposed to be able to cut and carry as much fodder as a pair of cattle will eat. After cutting the berseem receives a good flooding; if possible the irrigation water is allowed to run off the plots at one end while it runs in at the other. Thereafter the plot should give a cutting once a month till it is dried out by the hot winds in early summer.

The succeeding cuttings are taken by tethering cattle in the crop. They are tied to pegs and moved forward as required. An acre should keep 100 bullocks for a day. The cutting requires careful supervision, the object is to get an uniform cut over the whole plot so that the next lot will sprout as evenly as possible. Sheep often follow the cattle to finish off.

When the crop is being kept for seed it should not be cut or grazed after March. £3 per acre per cut is not an unusual price to obtain in Egypt. As to fodder, Bolland, the Egyptian Government Botanist, gives the following yields per acre for 1 cut.

Fahl	.	.	27,132 rottles (Upper Egypt basin land, it only gives 2 cuts).
Miscawi	.	.	19,026 rottles.
Baali	.	.	12,726 rottles.
Khadrawi	.	.	15,120 rottles.

NOTE.—1 rot (le = 99 (lb.).

These yields are probably from 1st class land in middle Egypt. In the North 4.5 tons per acre would be a good crop.

About 200 lb. of seed per acre would not be considered a bad yield on "3 Kantar" cotton land, *i.e.*, land which produces 300 lb. of ginned cotton per acre.

### III. Cultivation Figures in Sind.

Sukker Government Farm, Sind	Area	Year	Sown after Jowar on the
Plot B 5	1 Acre	1914-15	24th October 1914.

This was sown rather late, but it is usually too hot to sow berseem in North Sind till the beginning of November. As it was after *jowar* the land was not ready before. In all including the preparation of the land 17 waterings were given. The land is stiff salt alluvium.



*Yields of above acre plot.*

	Date	Estimated yield	Value	Remarks
1st cutting .	23rd December 1914 . . .	60 maunds of 80 lb.	Rs. 14	Fed to bullocks.
2nd cutting .	21st February 1915	80    "    "	15	Sold.
3rd cutting .	25th March 1915	100    "    "	22	Sold.
4th cutting .	21st April 1915	80    "    "	19	Fed to bullocks.

The plot was ploughed in for cotton on the 23rd of April, else another cutting could have been obtained. 40 lb. seed was sown per acre.

## SUKKER GOVERNMENT FARM.

*Two plots cut and threshed for seed.*

	Area	Year	Sown after Sug-dasi Paddy
Plot D 1 . . .	1 acre	1913-14	14th November 1913.

	Date	Estimated yield	Value	Remarks
1st cutting .	15th January 1914	85 maunds	Rs. A. P. 20 8 0	Sold.
2nd cutting .	12th March 1914	60    "    "	13 8 0	Fed to bullocks.
3rd cutting .	1st June 1914	140 lb. seed		



FIELD AT SÜKKER.





	Area	Year	After paddy
Plot D 2 . . .	1 acre	1913-14	18th November 1913.

	Date	Estimated yields	Value	Remarks
1st cutting . . .	20th January 1914	65 maunds	Rs. A. P. 15 4 0	Sold.
2nd cutting . . .	16th March 1914	83 „	20 0 0	Fed.
3rd cutting . . .	1st June 1914	220 lb. seed		

## MIRPUR KHAS GOVERNMENT FARM.

	Area	Year	Sown after Bajra	Remarks
Plot F 1 . . .	$\frac{3}{4}$ acre	1913-14	15th November 1913.	30 lb. seed sown.

9 irrigations	Date	Yields	Value per acre
1st cutting . . .	29th December 1913	4,800 lb. per acre	Rs. A. P. 18 12 0
2nd cutting . . .	19th January 1914	6,933 „ „ „	27 1 4
3rd cutting. . .	27th February 1914	3,200 „ „ „	12 8 0

Cut for seed 24th May 1914, estimated yields per acre,  $1\frac{1}{2}$  maunds.

## MIRPUR KHAS GOVERNMENT FARM.

	Area	Year	Sown after Jowar	Remarks
Plot D 1	$\frac{3}{10}$ th acre	1914-15	18th October 1914	Resown 31st October 1914.

	Date	Yields
1st cutting . . . .	27th December 1914	4,000 lb. per plot.
2nd cutting . . . .	5th February 1915	4,800 " " "
3rd cutting . . . .	12th March 1915	5,200 " " "
4th cutting . . . .	12th April 1915	3,600 " " "
5th cutting . . . .	30th April 1915	1,600 " " "

The plot was then ploughed in for cotton.

The cost of seed in Sind in an average year is Rs. 16 per maund of 80 lb., this includes all freight charges, etc.

## IV. Cultivation.

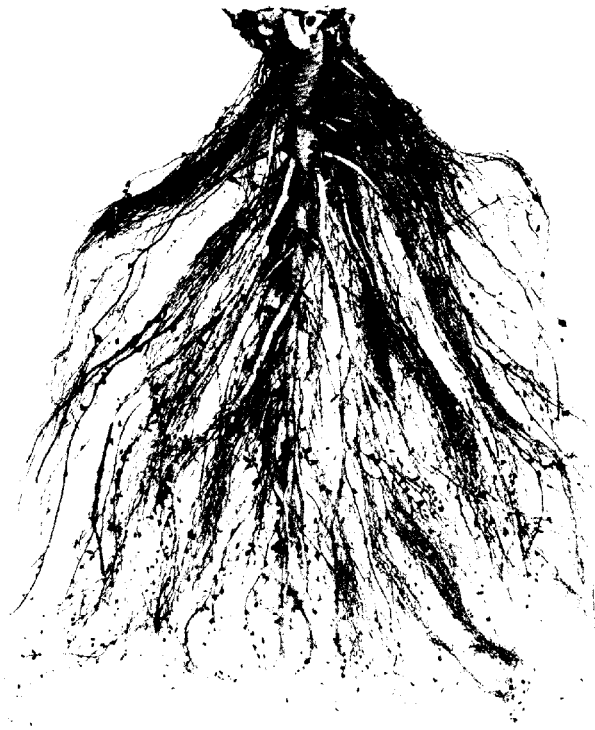
The seed should be steeped for 24 hours before sowing. It is best sown in ploughed land which has been irrigated to a depth of 2"-3".

The time for sowing is at the change between the hot and beginning of the cold seasons. 30-35 lb. seed per acre can be sown.

It can be sown in standing cotton or in wet paddy provided that in the latter case the water will not remain stagnant too long.

The amount of water required and the number of irrigations will be a matter for local conditions to settle. In a hot dry country like Sind when the hot weather lasts till end of November many irrigations are required especially when the land is alkaline.

PLATE III



ROOT OF BERSEEM 5 MONTHS FROM SOWING, SHOWING NODULES CONTAINING  
NITROGEN-FIXING BACTERIA.



It has been estimated that a good crop of berseem returns 300 lb. of available nitrogen to the soil per acre, as by the end of the season the roots are covered by nodules containing nitrogen-fixing bacteria. This is of course only when the crop is eaten on the ground and not seeded. Feeding by tethering cattle requires the most careful attention. The land should be slightly moist but not soft enough to cause damage to root crowns by treading of animals. They should be moved forward frequently so as to clean the land and yet get plenty of food.

After the first cut there is little fear of 'blowing' or 'hoven' and then only at the beginning while the animals are getting used to the new food. Cases of tympanitis can generally be traced to 'senji' (*Melilotus parviflora*) growing as a weed among the berseem. Though this *senji* is grown as a fodder crop in India it is always regarded as a harmful weed in Egypt under the name of 'handagok'. It is only suitable for hay.

Berseem makes excellent hay though there is loss on handling as it is brittle. A trial truck load of hand-baled hay was sent to Mr. Crawford, Veterinary Surgeon, Bombay. After trial in his stables he stated it was the best hay he has handled in India and was quite equal to Canadian red clover hay.

## V. Future of Berseem in India.

Berseem fills a place in a country like Sind which no other crop is capable of filling. What is wanted there is a cold weather leguminous fodder crop which will grow in an alkali soil. There is ample fodder in the hot weather with *bajra*, *jowar* and natural grass, but by February and March the fodder supply invariably gets very short and cattle begin to get starved, and fall a prey in large numbers to contagious diseases. Among all the cold weather fodder crops tried against berseem at Mirpur Khas none in any way approached it. Sbaftal (*Trifolium resupinatum*) was the nearest to fulfil requirements, but it was not nearly so quick a grower nor was the quality of the fodder so good. Lucerne is as good quality but when tried alongside berseem on the Landhi Government Farm was a much slower grower and a poorer yielder. It also occupies the ground in the hot weather when a valuable crop like cotton might be taken and when large quantities of fodder from *jowar*, *bajra* and maize are available. Lucerne very soon gets choked with weeds.

The present obstacles to the large development of berseem cultivation are the difficulties in getting seed and the amount of irrigation water required. The latter is considerably more than that required for wheat, the usual cold weather crop. A 200-acre seed farm has now been established in Sind fitted with a power-threshing machine and it



will be seen if the seed difficulty can be overcome. It is now in the charge of Mr. T. F. Main. Growers from other parts of India report satisfactory yields of seed and Mr. Robertson Brown at Peshawar gets good seed in addition to numerous cuts of fodder.

Berseem has also been grown in non-irrigated districts when the conditions were suitable, frequently after rice, and the results have been highly spoken of. There are many parts in India which remain to be tried.

The question of the improvement of the cattle in any district is bound up with that of fodder. So with the improvement and increase of fodder it is possible to improve cattle. Attempts to improve cattle and milk supply in the face of diminishing grazing and with the extension of crops like cotton are doomed to failure unless the fodder problem is tackled first. Berseem growing is not a speculative experiment for India, there is the existing object-lesson of one million acres annually cultivated in Egypt.

PUSA,        )  
*July, 1916.*  )

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